(51) International Patent Classification[7]:   H04Q 7/22

(21) International Application Number:
PCT/GB2005/003204

(22) International Filing Date: 15 August 2005 (15.08.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0418119.4   13 August 2004 (13.08.2004)   GB

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: TELECOMMUNICATIONS SERVICES APPARATUS (SMS ROUTER) AND METHOD FOR DELIVERING SHORT MESSAGES (SMS) VIA THE HOME NETWORK OF THE RECIPIENT
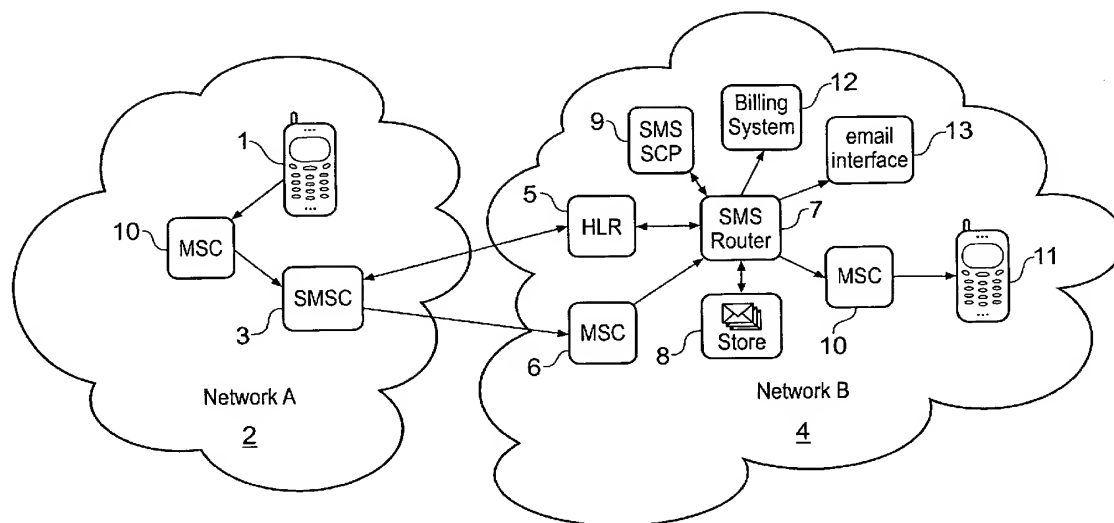
(57) Abstract: In a mobile telephone system, an SMS router (7) receives a mobile terminated text message from a terminal (1) addressed to the terminal (11) of a network subscriber. The received mobile terminated message is stored in an MT store (8), and then delivered to a required recipient, who may be the network subscriber and/or a different destination as a result of copy or divert. The SMS muter (7) receives a "send routing information for short message" signal from a signalling transfer point, global title translator or home location register, which provides information as to the original destination address of the received text message.

TELECOMMUNICATIONS SERVICES APPARATUS (SMS ROUTER) AND METHOD FOR DELIVERING SHORT MESSAGES (SMS) VIA THE HOME NETWORK OF THE RECIPIENT

This invention relates to telecommunications services apparatus and methods for use with a mobile telecommunications system, such as a mobile telephone system. In particular, the invention relates to improved architectures for message handling.

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The invention is described in the context of GSM networks, but has applicability to other mobile network types. The term text messaging where used in this document is taken to mean any form of text messaging including but not limited to SMS, EMS, MMS and the like.

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In traditional GSM networks, the Short Message Services (SMS) provide a facility for the transfer of a Short Message between an originating Mobile Station (MS) and a Short Message Service Centre (SMSC), and between the SMSC and a receiving MS. Messaging between a network Host or Application and an MS is also supported. The
15   SMSC is a store and forward device, conceived to overcome the limitations of early GSM deployments where network coverage and MS battery life were not as good as they are today. In modern networks, the requirement for storage is very much reduced, with typically 80%+ of messages being directly deliverable on the first attempt. Indeed some new GSM networks are being deployed with no SMSCs at all.

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The GSM Specifications (now under the ownership of the 3rd Generation Partnership Project, 3GPP) define a messaging architecture where the Message Centre that provides message storage resides in the home network of the message sender. This means that the delivery process, including all aspects of retry schedules and validity
25   period, are all under the sole control of the sending network. The recipient therefore has generally no means of controlling this, since messages may come from any network anywhere in the world. If the recipient is temporarily unavailable, then multiple messages may be stored in many different networks, waiting for a future opportunity to deliver. If the recipient were to decide that he would like all of these
30   messages delivered for example by email, then the architecture does not permit this, because the messages are under the control of other networks.

This is in contrast to other forms of communication such as Voice mail. Voice mail messages are always stored in a mailbox in the user's home network. Similarly with multimedia messaging (MMS); the message is passed to a Multimedia Message

5   Service Centre (MMSC) in the recipients home network before delivery and stored there if necessary. Likewise email is stored on a server at one's own ISP, and can be retrieved on demand from any Internet terminal.

It can be seen therefore that the traditional architecture of SMS is anomalous, and that

10   the principle of storing messages in the sender's network until they can be delivered by SMS places severe restrictions on the ways in which the intended recipient can handle the message.

Furthermore with the present architecture, if the recipient is roaming, then messages

15   sent from other networks will not pass through the home network at all. Desirable services such as Divert, Copy, Log, and email archive are not therefore possible with the traditional architecture.

It is known that a malicious network or service provider with SS7 access can send

20   faked Mobile Terminated messages to any subscriber on any network. These messages can contain Over The Air (OTA) updates which can for example change the SIM settings of the recipient to cause subsequent WAP connections to dial a premium rate number. Such malicious activity cannot be trapped by operators, even for premium customers, using a traditional architecture where the Mobile Terminated message may

25   not even pass through the victim's home network.

According to the first aspect of the invention there is provided telecommunications services apparatus for use with a mobile telecommunications network, the apparatus comprising means for receiving a mobile terminated text message addressed to a

30   subscriber of the telecommunications network, means for storing the received mobile terminated text message, and means for delivering the text message from the storing means to a required recipient.

According to a second aspect of the invention there is provided a telecommunications services method in a mobile telecommunications network, the method comprising receiving a mobile terminated text message addressed to a subscriber of the telecommunications network, storing the received mobile terminated text message, and delivering the stored text message to a required recipient.

Other aspects of the invention include a computer program having computer executable instructions, which when loaded on to a computer is operable to cause the computer to perform the above method, and a computer program product comprising a computer readable medium having recorded thereon information signals representative of the computer program.

According to a further aspect of the invention there is provided a telecommunications services apparatus for use with a mobile telecommunications network, operable to receive and store mobile terminated text messages addressed to subscribers of the telecommunications network, and further operable to deliver messages from the store to the required recipients.

The originally intended recipient may wish to copy, divert or otherwise modify messages, and the term "required recipient" is to include these possibilities.

Also, messages may be intelligently modified either when routed or stored in the home network, and the term "messages" is to include these options

According to a further aspect of the invention, the apparatus is operable to process a stored message for the purpose of controlling its destination, its means of delivery, or its routing.

According to a further aspect of the invention, the apparatus is operable to process a stored message for the purpose of implementing an application.

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According to a further aspect of the invention, the apparatus is operable to process a stored message for the purpose of permitting access to the message from another medium, such as a fixed line network, a data network or by text to speech.

5   According to a further aspect of the invention, the apparatus is operable to process a stored message for the purpose of allowing on-demand or polled delivery or re-delivery, even if the message has been diverted or otherwise processed.

According to a further aspect of the invention, the apparatus is operable to process
10   stored messages for the purpose of controlling the delivery order, particularly in respect of messages that are segments of a concatenated message.

The invention will now be described by way of example with reference to the accompanying drawing (Figure 1) which shows telecommunications equipment
15   according to an embodiment of the invention.

Referring to Figure 1, there is shown a subscriber (1) of Network A (2) sending a message via a mobile switching centre MSC (10) and a short message service centre SMSC (3) in Network A, to a subscriber (11) in Network B (4). The delivery requires
20   the query of a home location register HLR (5) in Network B, and the message is then delivered via a gateway MSC (6) in network B and then to an SMS Router (7). The Router (7) copies the message into an associated store (8). Optionally a central controller, such as an SMS service control point SCP (9) may be used to provide additional intelligence for message routing or service implementation. Normally the
25   message would then be delivered via the MSC (10) to the recipient (11). A billing system (12) may be involved if for example the recipient is Pre-pay and roaming. Alternative or additional delivery means are exemplified by an email interface (13).

The SMS Router (7) may be, for example, a Telsis (RTM) SMS Router, manufactured
30   by Telsis Limited.

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A key aspect of the present technique is the adoption of an additional message store (8) in the Recipient's Network for Mobile Terminated (MT) messages, as distinct from the traditional architecture where the stores are only in the senders' networks. This will be referred to as a Recipient Network MT Store, or RN-MT Store. There are many

5 advantages to be obtained by adopting the principle of an RN-MT Store, that is an additional store in the recipient's network. It should also be understood that implementation of an RN-MT Store in no way contradicts or undermines the GSM system, and does not require decommissioning of any existing stores, but actually enhances GSM significantly, and provides a foundation for the implementation of a

10 wide range of services that are not possible with traditional architectures. The adoption of an RN-MT Store is therefore seen as a significant evolution for SMS, and other messaging systems that do not already employ this technique. The RN-MT Store can also assist in the eventual evolution to an architecture where the requirement for stores in the sender's network is significantly reduced or even removed altogether.

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The advantages of an RN-MT Store approach are now described.

In traditional SMS architectures, the SMSC (3) in the sender's network delivers the Short Message directly to the MSC/VLR where the recipient is currently attached.

20 Consequently, if the recipient is roaming, the Short Message does not pass through the recipient's home network at all. This has been a significant barrier to the development of any services, particularly business services, aimed at enhancing the capabilities of a message recipient (e.g. Divert, Copy, Log, Archive).

25 With the RN-MT Store approach, some or all messages, or those messages associated with particular subscribers, can be forced to pass through the home network before delivery. This means that any desired value-added services can then be applied to the messages.

30 In traditional SMS architectures, any foreign SMSC is permitted to perform an SRI_SM (Send routing information for Short Message) request, and can receive in response the IMSI and the VLR location where the subscriber is currently attached.

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For many customers this is an undesirable invasion of privacy, and for certain classes of premium customer may be unacceptable. The RN-MT Store solution, selectively for some or all customers, returns the address of the RN-MT Store instead of the subscriber's location. The true location is never released outside the home network.

5   Hence the solution provides location privacy.

The solution also provides absence privacy. Because the subscriber's store is always available, the message will always be delivered. Delivery receipts will be sent immediately indicating successful delivery. The sender is not able to use a delivery

10   receipt to determine for example when the recipient gets off a plane and switches his phone on. The RN-MT Store will deliver the message promptly to a user by the methods he chooses, over media and at times that are under the recipient's control.

Voice systems and also mobile telephone systems have supported a range of

15   conditional and unconditional divert (or forwarding) functions. However divert functionality is absent from text systems, not out of choice, but because the traditional architecture does not permit it. Adoption of the RN-MT Store approach allows some or all MT messages to be always directed via the home network, thereby closing the loophole that has previously prevented a full solution. Mobile originated MO

20   messages do not have this problem, since these always pass through the home network, and can easily be processed by SMS Routers in the MO path.

The use of SMS Routers in the MO and MT paths in conjunction with an RN-MT Store in the MT path provide a full solution for Divert and many other desirable value

25   added services.

Copying received messages to a second phone, logging sent and received messages, and archiving messages to an email account for ease of management are all functions that can be adopted once an RN-MT store based architecture is used. The use of a store

30   in the MT path allows the recipient to manage his messages even after delivery. For example, messages can be delivered immediately to one or more handsets, left in the

store for a defined period to allow for re-delivery requests, and then archived to email before being deleted from the store.

Anti-Spam has always been a difficult topic to address, not least because one man's Spam is another man's marketing message, so no blanket solution can satisfy all customers. However with an RN-MT Store approach, Spam filtering can be applied to messages in the store according to a provisioned class of service, preferably held in the HLR. Thus those recipients who want Spam filtering can select this feature and configure the level of protection required, while others may prefer to see all messages. Filtered messages may be sent to an email account for example rather than being delivered to a handset.

As discussed above, a malicious service provider has previously been able to send faked MT messages to any subscriber, these messages possibly containing OTA updates causing the recipient to make premium calls unknowingly when accessing WAP or GPRS content. The present technique can avoid this problem. However, this does not prevent the operator from sending genuine OTA messages, bypassing the Spam filter, for example by using an alternative interface such as an IP interface to the apparatus.

There is one area in which adoption of an RN-MT Store slightly alters the user experience from the point of view of the sender. This is in the area of delivery receipts. In most cases the sender of a message does not request a delivery receipt (sometimes called a delivery report) in which case there will be no change to system behaviour whatsoever as observed by the sender. However, if the sender does request a delivery receipt (the method of request being network dependent) then the sender would previously have received a successful delivery notification when the message reached the handset of the recipient. With an RN-MT Store system, the recipient has now devolved responsibility for message collection to the RN-MT Store. Consequently, the sender will receive a positive delivery notification once the message reaches the recipient's store. If the recipient is reachable as will be the case in 80% of transmissions, then delivery to the handset will occur almost simultaneously, and so

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altered behaviour of the receipt only applies to the remaining 20% of messages approximately where direct delivery is not possible.

5   At first sight this may appear to be a disadvantage, but there is an equally compelling benefit. The SMS delivery receipt in its current form rides roughshod over any desire for privacy on the part of the recipient. With email systems, the sender of a message may request a delivery notification, but the recipient has the final say and may accept or decline the request to send a receipt. However with SMS, the request for a receipt is invisible to the recipient, and the receipt is provided to the sender regardless of the

10   recipient's wishes for privacy. It is easy for a sender to use delivery receipts to determine when a person switches his phone on in the morning, or when he gets off a plane, or to determine that the phone is available to answer a call.

Furthermore it must be appreciated that the traditional behaviour of a delivery receipt

15   only indicates that the message has reached a handset, and not that it has reached a person. With email, the receipt indicates that the message has been opened, and therefore indicates the presence of a person. Therefore the change in SMS receipt behaviour caused by a move to an RN-MT Store is not as great as might be imagined. The receipt now indicates successful delivery to the recipient's authorised agent (i.e.

20   the store) instead of to a handset, but the store can have many more ways of contacting the user.

A preferred mode of operation of the present invention is now described.

25   Two types of message need to be considered: those that are mobile originated (MO), i.e. sent by a subscriber and those that are mobile terminated (MT), i.e. received by a subscriber. In the mobile originated case, it is known that all messages sent by a subscriber will be delivered to the Short Message Service Centre (SMSC) address in his home network. It is also known that Signalling Transfer Points (STPs) or Global

30   Title Translators (GTTs) can be programmed to route all mobile originated messages sent to this address through an equipment for processing prior to being delivered, either directly to the destination or to the SMSC.

As mentioned above, a suitable equipment for implementing the message processing is a Telsis SMS Router.

5   The global GSM system consists of a number of GSM networks. The network on which a subscriber is registered is known as his "home" network. When a subscriber sends a text message, the message is always delivered in the first instance to an equipment in his home network, typically an SMS Router or a Message Centre (SMSC). Delivery to an SMS Router is normally achieved by arranging for the SMS

10   Routers in the MO path of the network to take on the Global Title of the SMSCs, thereby receiving all of the MO messages addressed to an SMSC. This is the case even when the subscriber is roaming on another network. The SMS Router then queries the Home Location Register (HLR) of the destination subscriber's network and the message is then forwarded accordingly.

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The global address of a Message Centre is normally programmed into the subscriber's handset. This global address is interpreted by STPs or GTTs in the GSM network in order to deliver the message to the appropriate equipment.

20   The mobile terminating case is more difficult because there is no guarantee that in normal circumstances messages delivered to a subscriber's handset will pass through the subscriber's home network at all. It is known that in order to deliver a message to a subscriber, a query must be made to the HLR of the subscriber's home network in order to determine the current location of the subscriber. In the case of short messages

25   this query is known as "send routing information for short message" or SRI_SM. It is also known that STPs or GTTs can be programmed to route signalling messages to an alternative destination. In some cases it is possible to selectively route SRI_SM messages (and the SRI equivalent messages to voice calls) without affecting other types of messages. The present technique may make use of such routing to send

30   SRI_SM messages to the SMS Router (7).

Alternatively and in the preferred embodiment, the HLR (5) can be programmed to forward some or all SRI_SMs to the SMS Router (7), excluding those arriving from another SMS Router. The messages so routed may depend on the Class of service for the recipient, which is preferably stored as a field in the HLR (5). The SMS Router (7)

5 is then able to reply to these queries on behalf of the HLR (5), while also itself querying the HLR (5) to determine the true location of the recipient. However instead of returning the true location of the subscriber the SMS Router (7) can return its own location in the response to the SRI_SM. The effect of this is that the short message will be delivered not to the subscriber but to the SMS Router (7). This is true

10 regardless of the current locations of either the sender or the recipient. The SMS Router (7) is then able to implement any desired processing on the text message, for example archiving to email, before finally optionally forwarding the message onto the actual location of the subscriber as indicated by the HLR (5).

15 According to the present technique, the SMS Router (7) can communicate with the RN-MT Store (8), and preferably all messages received by the SMS Router (7) are placed into the RN-MT Store (8) before the first delivery attempt. Once in the store, the SMS Router (7), preferably but not necessarily in conjunction with centralised intelligence provided by the SMS SCP (9), can decide what processing to perform on

20 the message. This may typically include implementing optional diverts, copies, anti-spam filtering etc. Preferably once processing is complete, the message may be delivered accordingly. Delivery routes may include SMS, email, text to speech or other methods.

25 The RN-MT Store (8) acts like a first-in first-out (FIFO) buffer in respect of the messages for any one recipient. This ensures that the delivery order is preserved. The RN_MT Store (8) preferably behaves as a single network store, accessible from any SMS Router. This may be achieved in a variety of ways, such as implementing a single physical store, by using central intelligence to arrange for multiple physical stores to

30 appear as one store, or by other means. Data may also be stored in multiple stores for redundancy.

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The adoption of the RN-MT Store (8) aligns SMS with several other forms of messaging, and opens the possibility of a unified messaging mailbox, where recipients can manage and receive multiple forms of messaging including SMS in a single inbox. It is not possible with traditional SMS architectures to include SMS in such a scheme.

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Registration and activation of value added services involving the SMS Router (7) and the RN-MT Store (8) are preferably achieved using USSD, SMS, Interactive Voice services, WAP or the web, and arranging for the equipment(s) handling these interfaces to pass suitable configuration messages to the SMS Router (7) or SMS SCP

10   (9). USSD is preferably used between the SMS Router (7) and the HLR (5) for services where HLR storage of a setting is required. Other methods are possible.

In so far as the embodiment(s) of the invention described above may be implemented, at least in part, using software controlled processing apparatus, it will be appreciated

15   that a computer program providing such software control and a storage medium by which such a computer program is stored are envisaged as aspects of the invention.

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CLAIMS

1.   Telecommunications services apparatus for use with a mobile telecommunications network, the apparatus comprising means for receiving a mobile terminated text message addressed to a subscriber of the telecommunications network, means for storing the received mobile terminated text message, and means for delivering the text message from the storing means to a required recipient.

2.   Apparatus according to claim 1, comprising means for processing a stored text message for the purpose of controlling its destination, its means of delivery, or its routing.

3.   Apparatus according to claim 1, comprising means for processing a stored text message for the purpose of implementing an application.

4.   Apparatus according to claim 1, comprising means for processing a stored text message for the purpose of permitting access to the message from another medium.

5.   Apparatus according to claim 4, wherein the other medium is a fixed line network, a data network or by text-to-speech.

6.   Apparatus according to claim 1, comprising means for processing a stored text message for the purpose of allowing on-demand or polled delivery or re-delivery.

7.   Apparatus according to claim 1, comprising means for processing stored text messages for the purpose of controlling the delivery order.

8.   Apparatus according to claim 7, wherein the processing means is operable to control the delivery order of segments of a concatenated message.

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9.   Apparatus according to any one of claims 1 to 8, wherein the receiving means is operable to receive a "send routing information for short message" signal so as to provide information as to the original destination address of the received text message.

10.   Apparatus according to claim 9, wherein the "send routing information for short message" signal is received from a signalling transfer point or a global title translator.

11.   Apparatus according to claim 9, wherein the "send routing information for short message" signal is received from a home location register.

12.   Apparatus according to claim 9, claim 10 or claim 11, wherein the receiving means is operable to reply to the "send routing information for short message" signal on behalf of a home location register of the network.

13.   Apparatus according to any one of claims 1 to 12, wherein the receiving means and/or the storing means are operable in conjunction with centralised intelligence.

14.   Apparatus according to any one of claims 1 to 13, wherein the receiving means is operable to return a delivery receipt in respect of the received mobile terminated text message.

15.   A telecommunications services method in a mobile telecommunications network, the method comprising receiving a mobile terminated text message addressed to a subscriber of the telecommunications network, storing the received mobile terminated text message, and delivering the stored text message to a required recipient.

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16.   A method according to claim 15, including processing a stored text message for the purpose of controlling its destination, its means of delivery, or its routing.

5   17.   A method according to claim 15, including processing a stored text message for the purpose of implementing an application.

18.   A method according to claim 15, including processing a stored text message for the purpose of permitting access to the message from another medium.

10   19.   A method according to claim 18, wherein the other medium is a fixed line network, a data network or by text-to-speech.

20.   A method according to claim 15, including processing a stored text

15   message for the purpose of allowing on-demand or polled delivery or re-delivery.

21.   A method according to claim 15, including processing stored text messages for the purpose of controlling the delivery order.

20   22.   A method according to claim 21, wherein the delivery order of segments of a concatenated message is controlled.

23.   A method according to any one of claims 15 to 22, wherein a "send routing information for short message" signal is received so as to provide information

25   as to the original destination address of the received text message.

24.   A method according to claim 23, wherein the "send routing information for short message" signal is received from a signalling transfer point or a global title translator.

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25.   A method according to claim 23, wherein the "send routing information for short message" signal is received from a home location register.

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26.   A method according to claim 23, claim 24 or claim 25, wherein a reply is sent to the "send routing information for short message" signal on behalf of a home location register of the network.

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27.   A method according to any one of claims 15 to 26, wherein operations are conducted in conjunction with centralised intelligence.

28.   A method according to any one of claims 15 to 27, wherein a delivery
10   receipt is returned in respect of the received mobile terminated text message.

29.   A computer program having computer executable instructions, which when loaded on to a computer is operable to cause the computer to perform the method according to any one of claims 15 to 28.

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30.   A computer program product having a computer readable medium having recorded thereon information signals representative of the computer program according to claim 29.
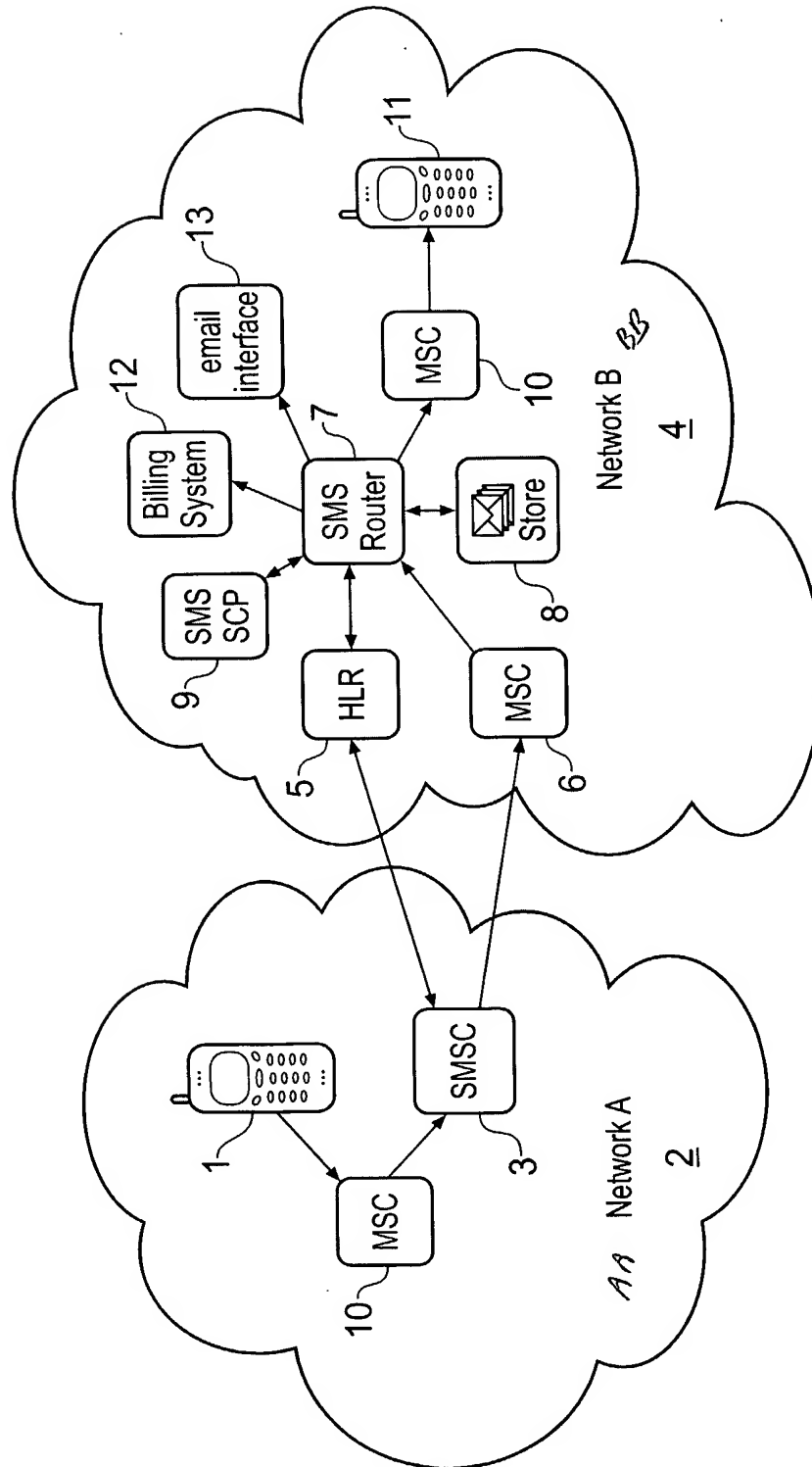
1/1

Fig. 1

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
H04Q7/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/049461 A (INTELLPROP LIMITED; WILSON, JEFFREY) 12 June 2003 (2003-06-12)	1-5, 9-12, 15-19, 23-26, 29,30
A	abstract	6-8,13, 14, 20-22, 27,28
	figures 3,4 page 5, line 16 – page 6, line 20 claims 1,5-7	
	-/--	

☒ Further documents are listed in the continuation of box C.   ☒ Patent family members are listed in annex.

° Special categories of cited documents :

'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

'O' document referring to an oral disclosure, use, exhibition or other means

'P' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

'&' document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 November 2005	22/11/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Möll, H-P

Form PCT/ISA/210 (second sheet) (January 2004)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	abstract page 4, lines 11-30 page 5, lines 6-13 page 7, lines 19-30 page 8, lines 1-6 claims 1,2,6-9 figures 3,4 page 8, lines 27-29 page 9, lines 13,14 _____	7-12, 21-26
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A	abstract figure 2 paragraphs '0016! - '0018! paragraphs '0023!, '0024! paragraphs '0027!, '0028! paragraph '0034! paragraphs '0037! - '0039! _____	7,8,13, 14,21, 22,27,28

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